What is claimed is:

1. A battery comprises:

a battery can housing an cell that supplies electrical energy at terminals of the cell by an electro-chemical reaction with oxygen, the can including:

a first member having at least one hole that is exposed to air; and

a second member; and

a mechanism coupled to one of the first and second members to move the one of the first and second members such that when current is drawn from the battery, the opening in the member allows air to pass into the battery, and to move the one of the first and second members such that when current is not drawn from the battery, the opening in the member is not in registration to inhibit air to pass into the battery.

2. The battery of claim 1 wherein the first and second members are coaxially disposed cylinders each having at least one opening that are placed in and out of registration to allow or inhibit air from passing into the battery.

3. The battery of claim 1 wherein the first and second members are coaxially disposed cylinders each having a plurality of openings.

4. The battery of claim 1 wherein the first and second members are coaxially disposed cylinders each having a plurality of openings arranged in a column along the length of the cylinders.

5. The battery of claim 1 wherein the first and second members are cylinders and the mechanism is coupled to the second member that is coaxially disposed within the first member.

6. The battery of claim 1 wherein the mechanism is an actuator comprised of a shape memory alloy material.

7. The battery of claim 1 wherein the mechanism is an actuator comprised of a high force, low displacement shape memory alloy (SMA).

8. The battery of claim 1 wherein actuator is coupled to a circuit and only draws power during a change of state allowing the circuit to minimize drain on the battery.

9. The battery of claim 6 wherein the actuator is a wire.

10. The battery of claim 9 further comprising a member coupled between an upper end portion of the second member and the wire to transfer a force generated by the wire to the second member.

11. The battery of claim 6 wherein the actuator is a ribbon.

12. The battery of claim 11 further comprising a member coupled between an upper end portion of the second member and the wire to transfer a force generated by the wire to the second member.

13. The battery of claim 6 wherein the actuator is a ribbon, wherein the first and second members are coaxially disposed cylinders each having a plurality of openings arranged in a column along the length of the cylinders.

14. The battery of claim 1 wherein the first member is a cylinder and the second member is a ribbon of a shape memory alloy material, the ribbon disposed over the at least one hole in the first cylinder.

15. The battery of claim 1, wherein the first and second members are coaxially disposed cylinders each having a plurality of openings arranged in a column along the length of the cylinders.

16. A air valve for a battery comprises:

a first member having at least one hole that is exposed to air;

a second member having at least one hole; and

a mechanism coupled to one of the first and second members in order to move the one of the first and second members such that when current is consumed from the battery, the opening in the member is in registration with the opening in the second member to allow air to pass through the valve, and to move the one of the first and second members such that when current is not drawn from the battery, the opening in the member is not in registration with the opening in the second member to prevent air to pass through the valve.

17. The air valve of claim 16 wherein the first and second members are coaxially disposed cylinders each having at least one opening that are placed in and out of registration to allow or inhibit air from passing through the valve.

18. The air valve of claim 16 wherein the first and second members are coaxially disposed cylinders each having a plurality of openings that are placed in and out of registration to allow or inhibit air from passing into the battery.

19. The air valve of claim 16 wherein the first and second members are coaxially disposed cylinders each having a plurality of openings arranged in a column along the length of the cylinders that are placed in and out of registration to allow or inhibit air from passing through the valve.

20. The air valve of claim 16 wherein the mechanism is an actuator comprised of a shape memory alloy material.

21. The air valve of claim 16 wherein the mechanism is an actuator comprised of a high force, low displacement shape memory alloy (SMA).

22. The air valve of claim 16 wherein actuator is coupled to a circuit and only draws power during a change of state allowing the circuit to minimize drain on the battery.

23. The air valve of claim 16 wherein the actuator is a wire.

24. The air valve of claim 16 further comprising a member coupled between an upper end portion of the second member and the wire to transfer a force generated by the wire to the second member.

25. The air valve of claim 16 wherein the actuator is a ribbon.

26. An air valve for a battery comprises:

a first cylindrical member having at least one hole in sidewalls of the member, the hole exposed to air;

a ribbon of a shape memory alloy material, the ribbon disposed over the at least one hole in the first cylinder; and

a circuit coupled to ribbon in order to move the ribbon such that when current is consumed from the battery, the opening in the cylindrical member is uncovered by the ribbon to allow air to pass through the valve, and to move the ribbon such that when current is not drawn from the battery, the opening in the cylindrical member is covered by the ribbon to inhibit air from passing through the valve.

27. The battery of claim 1, wherein the cylindrical member has a plurality of openings arranged in a column along the length of the cylindrical member and the ribbon covers or uncovers the plurality of openings.

28. The battery of claim 1, wherein the cylindrical member has a plurality of openings, arranged in a plurality of columns of openings along the length of the cylindrical member and further comprises:

a plurality of ribbons including the ribbon, the plurality of ribbons covering or uncovering the plurality of openings arranged in the plurality of columns.

29. A battery comprises:

a cell;

an air valve to control the level of air in the cell;

an air plenum surrounding the cell;

a circuit to monitor levels of O_2 in the air plenum.

30. The battery of claim 29 wherein the circuit to monitor levels of O_2 in the air plenum comprises:
a florescent detector/sensor that senses and responds to changes in O_2 in the plenum by using the "quenching effect" of oxygen on a fluorescent material.

31. The battery of claim 30 wherein fluorescent material absorb light in a certain wavelength range and emit light over a different range of wavelengths to give an indication of the level of O_2 in the plenum.

32. The battery of claim 30 wherein the fluorescent sensor comprises a permeable polymer matrix that is doped with a dopant to produce fluorescence in the presence of oxygen.

33. The battery of claim 30 wherein the fluorescent sensor further comprises:
a LED emitter to illuminate the matrix material in the excitation spectrum; and
a photodiode receiver to detect a phase shift in light spectrum and hence change of the oxygen level.

34. The battery of claim 30, further comprises:
a signal processor coupled to the fluorescent sensor, the processor executing an empirically determined algorithm to monitor the level of oxygen in the cell according to the current being drawn from the cell in order to regulate the air valve and hence air flow into the cell.

35. The battery of claim 34, wherein the signal processor outputs a signal that can be used to switched open/close the air valve and thus modulate the supply of air to the cell dependant current drawn from the cell.

36. The battery of claim 34, wherein the signal processor executes an algorithm to operate the air mover in direct relationship to the oxygen consumed by the cell, and output

current/voltage levels produced from the cell.

37. The battery of claim 31, wherein the fluorescent O_2 sensor is comprised of Pt (TfPP) (platinium tetraphenylporphryrin), Pt OEP (platinium octaethylporphryrin),or $Ru(BaThO)_3$ (ruthenimum complexes) immobilized in an oxygen permeable matrix.

38. The battery of claim 29, wherein the cell is a fuel cell.

39. The battery of claim 29, wherein the cell is a direct methanol fuel cell.

40. The battery of claim 29, wherein the cell is a metal-air cell.

41. The battery of claim 29, wherein the cell is a zinc-air cell.

42. The battery of claim 29, wherein the fuel cell is a direct methanol cell and the air valve is used to isolate in an anode chamber of the fuel cell from crossing over to a cathode when the anode catalyst is electrically disconnected from a load preventing evaporation of the methanol in the cell.

43. A circuit to monitor levels of O_2 in the air plenum, the circuit comprising:
a fluorescent detector/sensor that senses and responds to changes in O_2 in the plenum by using the "quenching effect" of oxygen on a fluorescent material.

44. The circuit of claim 43, wherein fluorescent material absorb light in a certain wavelength range and emit light over a different range of wavelengths to give an indication of the level of O_2 in the plenum.

45. The circuit of claim 43, the fluorescent sensor comprises a permeable polymer matrix that is doped with a dopant to produce fluorescence in the presence of oxygen.

46. The circuit of claim 43, the fluorescent sensor further comprises:
a LED emitter to illuminate the matrix material in the excitation spectrum; and

a photodiode receiver to detect a phase shift in light spectrum and hence change of the oxygen level.

47. The circuit of claim 43, further comprises:

a signal processor coupled to the fluorescent sensor, the processor executing an empirically determined algorithm to monitor the level of oxygen in the cell according to the current being drawn from the cell in order to regulate the air valve and hence air flow into the cell.

48. The circuit of claim 47, wherein the signal processor outputs a signal that can be used to switched open/close the air valve and thus modulate the supply of air to the cell dependant current drawn from the cell.

49. The circuit of claim 47, wherein the signal processor executes an algorithm to operate the air mover in direct relationship to the oxygen consumed by the cell, and output current/voltage levels produced from the cell.

50. The circuit of claim 43, wherein the fluorescent O_2 sensor is comprised of Pt (TfPP) (platinium tetraphenylporphryrin), Pt OEP (platinium octaethylporphryrin),or $Ru(BaThO)_3$ (ruthenimum complexes) immobilized in an oxygen permeable matrix.

51. A method of operating a battery, the method comprises:

controlling a quantity of air that enters an metal-air battery by:

moving a first cylindrical member having at least one hole that is exposed to air relative to a second member having a least one hole such that when current is consumed from the battery, the holes in the cylindrical members are in registration allowing air to pass into the battery and when current is not drawn from the battery, the holes are not in registration thus inhibiting air to pass into the battery.

52. The method of claim 51 wherein the first and second cylinders each have a plurality of openings.

53. The method of claim 51 wherein the first and second cylindrical members are coaxially disposed each having a plurality of openings arranged in a column along the length of the cylinders.

54. The method of claim 51 wherein moving comprises:

passing a current through a member comprised of a shape memory alloy material to change the shape of the member and effect movement of the first cylindrical member.

55. The method of claim 54 wherein the mechanism is an actuator comprised of a high force, low displacement shape memory alloy (SMA).

56. A method of operating a battery, the method comprises:

controlling a quantity of air that enters an metal-air battery by:

monitoring levels of O_2 in the battery by sensing and responding to changes in O_2 in battery and

moving a first cylindrical member having at least one hole that is exposed to air relative to a second member having a least one hole according to monitored levels of O_2 in the battery.

57. The method of claim 56, wherein monitoring uses a fluorescent sensor comprising a permeable polymer matrix that is doped with a dopant to produce fluorescence in the presence of oxygen, and the method further comprises:

monitoring the level of fluorescence.

58. The method of claim 57, further comprising:

outputting a signal to switched open/close an air valve to modulate the supply of air to the cell dependant upon the current drawn from the cell.